Future projections of the Greenland ice sheet climate simulated by the regional climate model MAR forced by 2 CMIP5 global models.

(WP 4.2)

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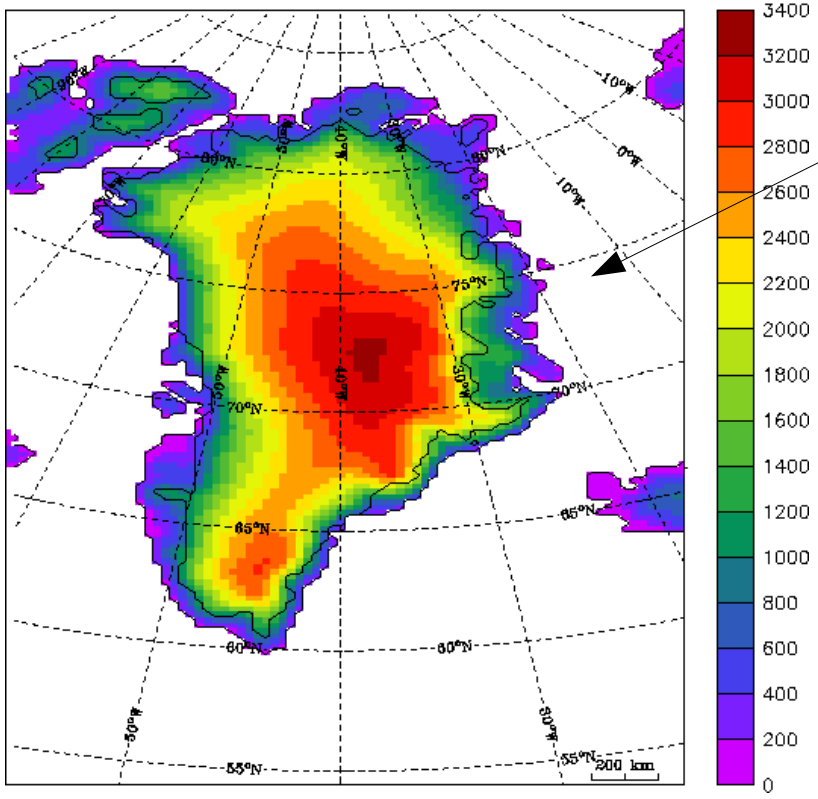
Regional Climate MAR model

Compared to the ICE2SEA MAR simulations, a new ice sheet mask is used here and the Bamber et al. (2001) topography is less smoothed.



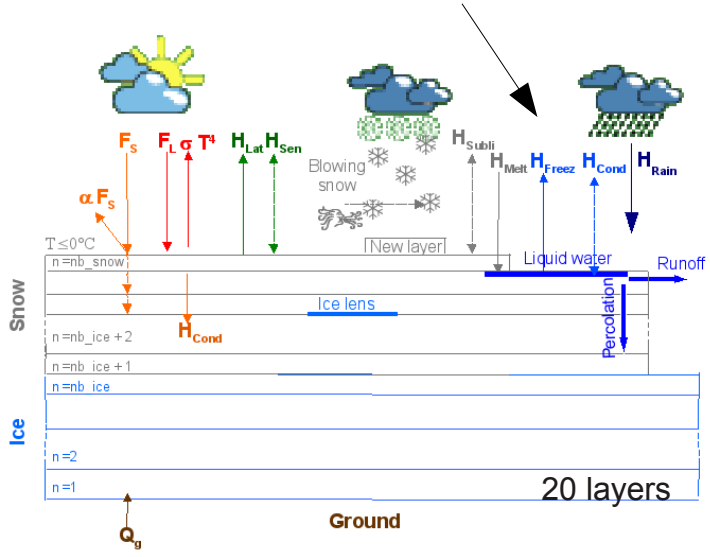
Topography at 25km

Regional climate model **MAR**

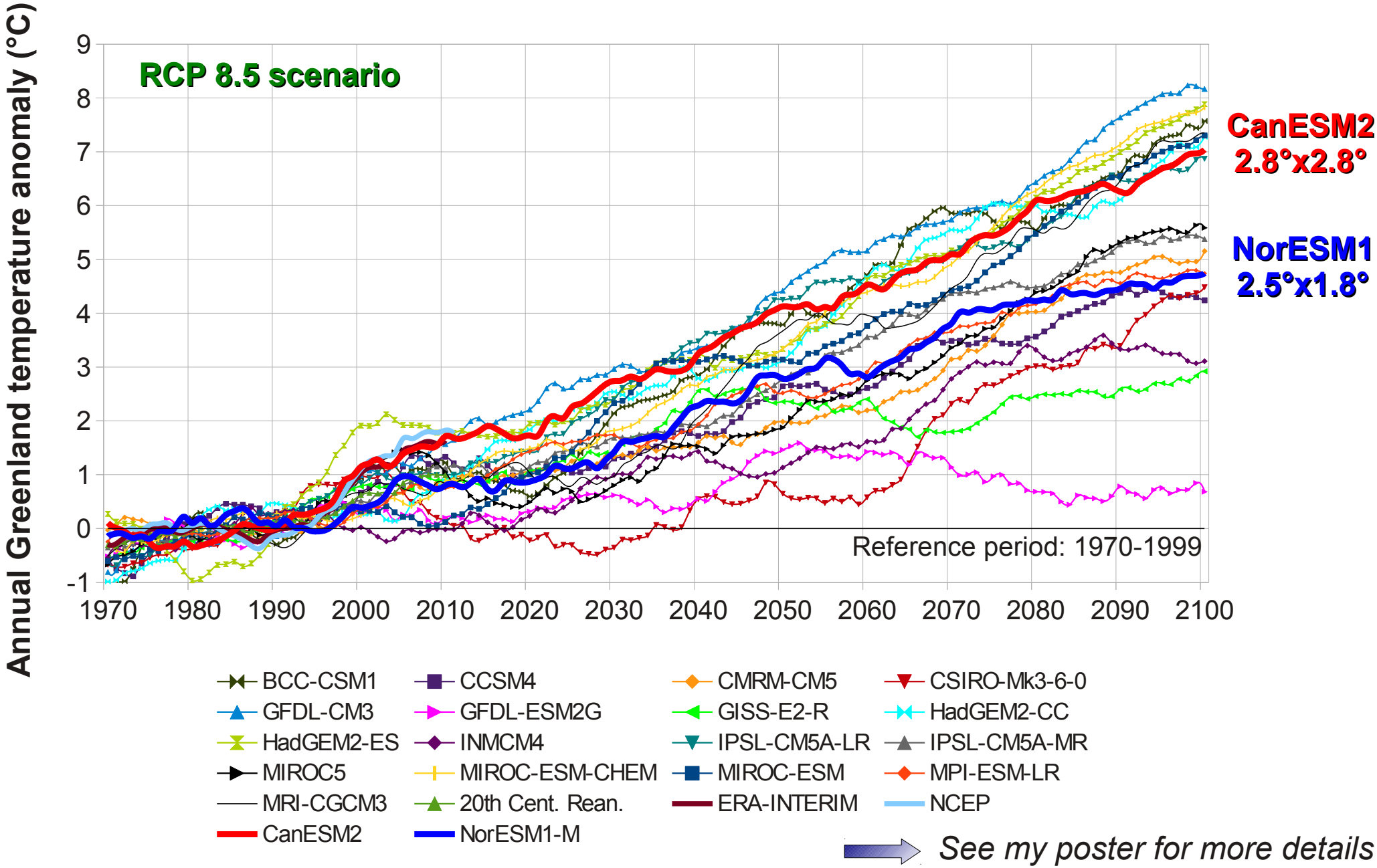
1st level: 3m, 25th level ~ 21km

Resolution: 25km

full coupled with a snow energy balance model

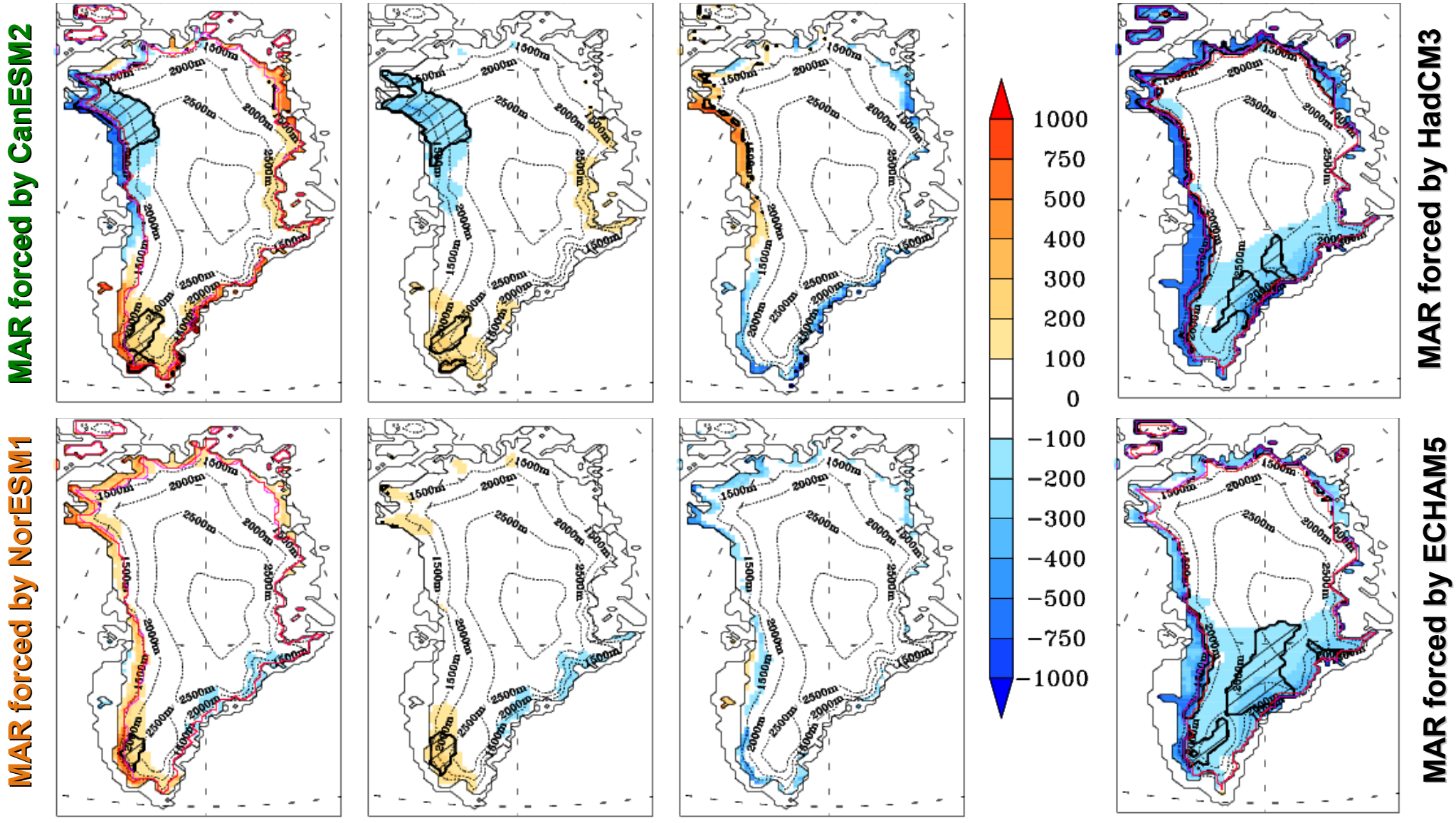


Global models from CMIP5



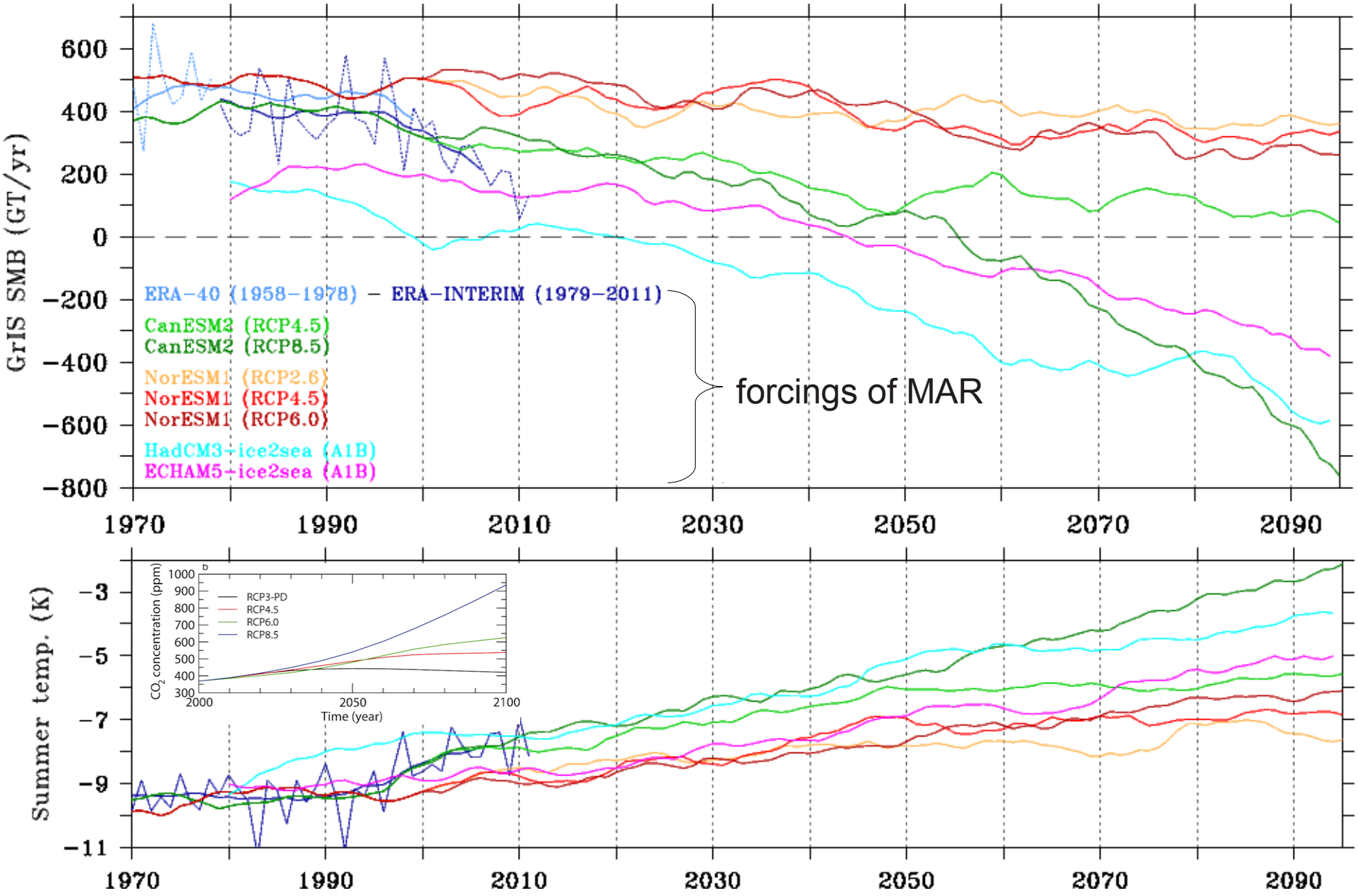
See my poster for more details

1. Current climate (1/1)

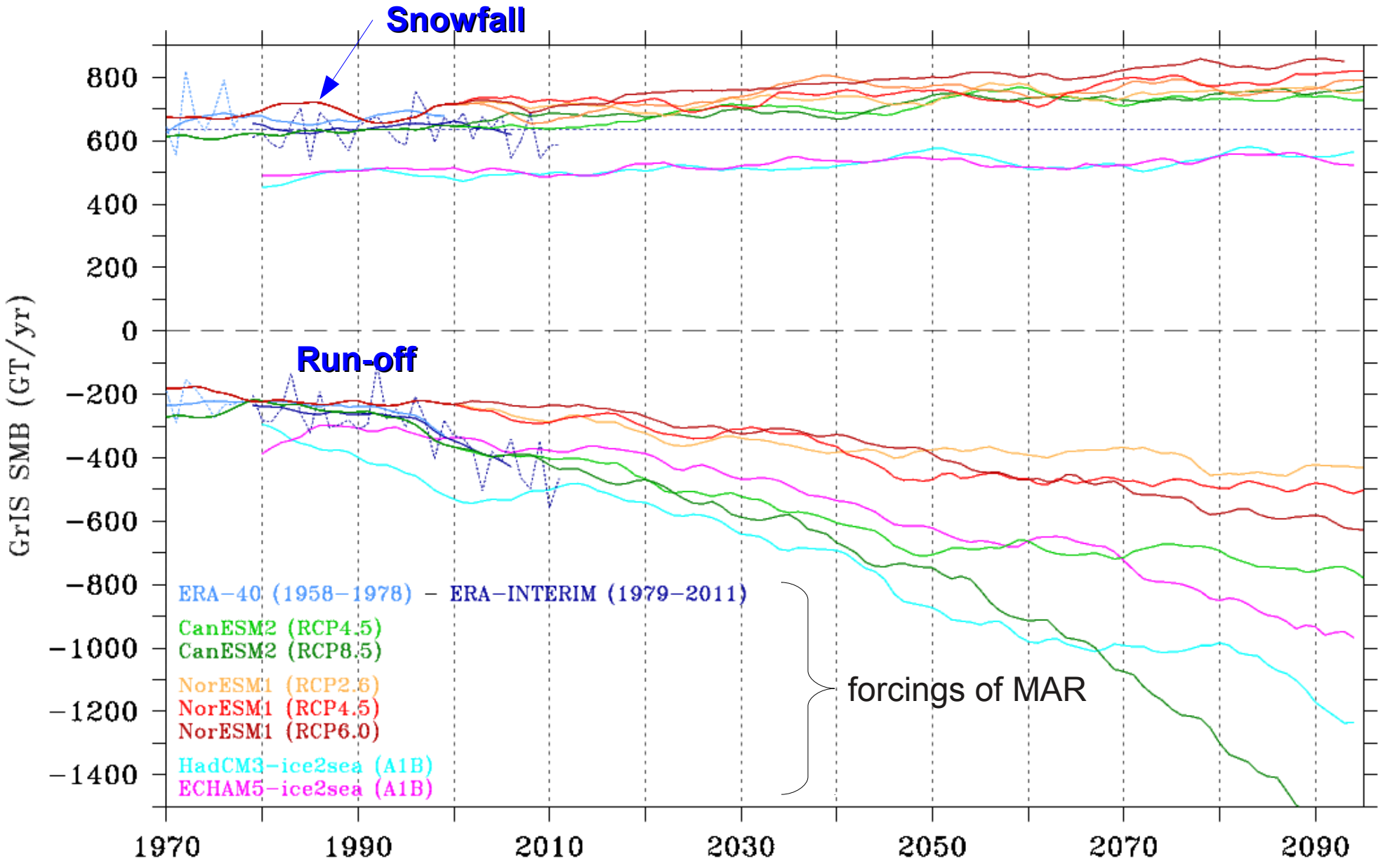


Anomalies in respect to MAR forced by ERA-INTERIM over 1980-1999

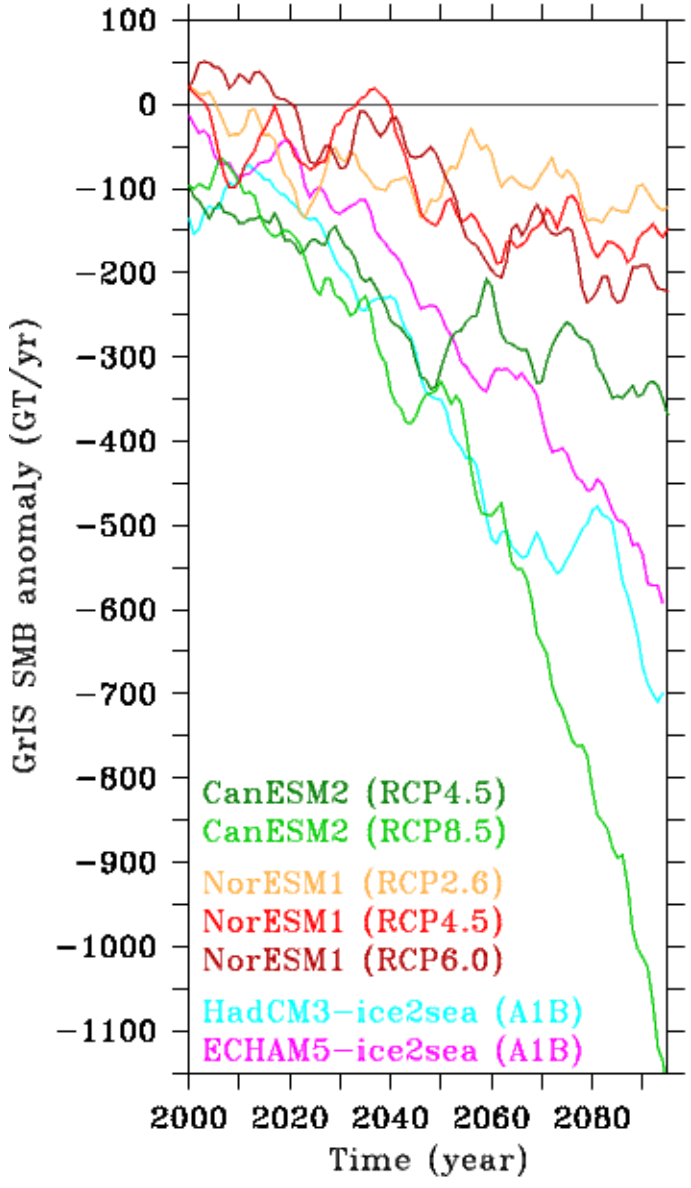
2. MAR based future climate (1/5)

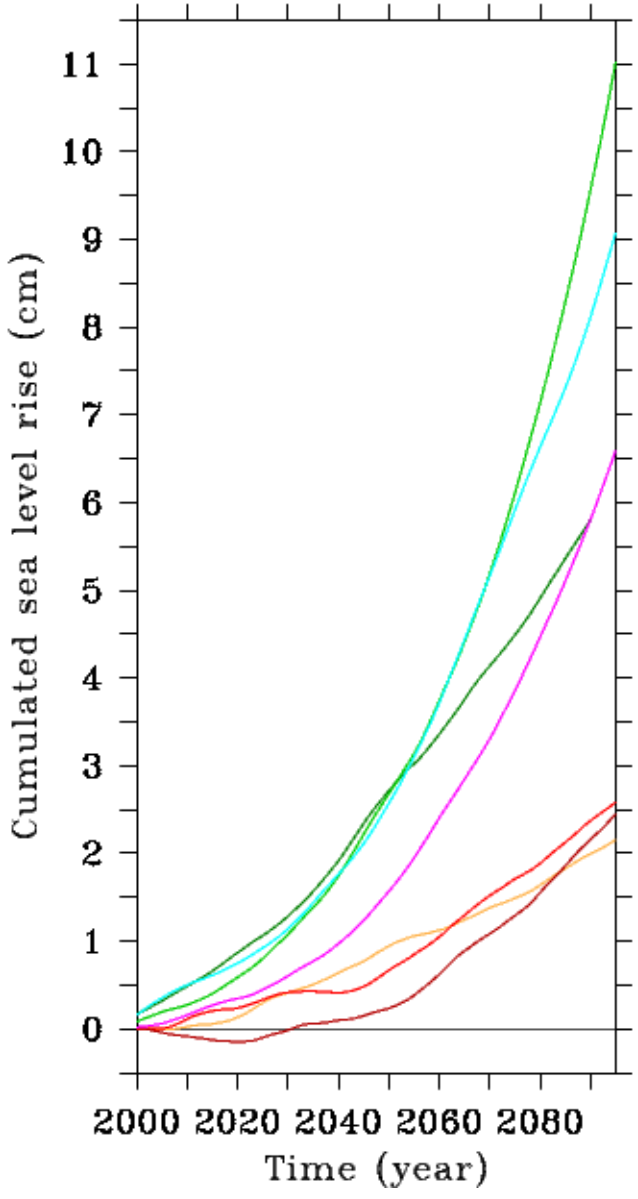


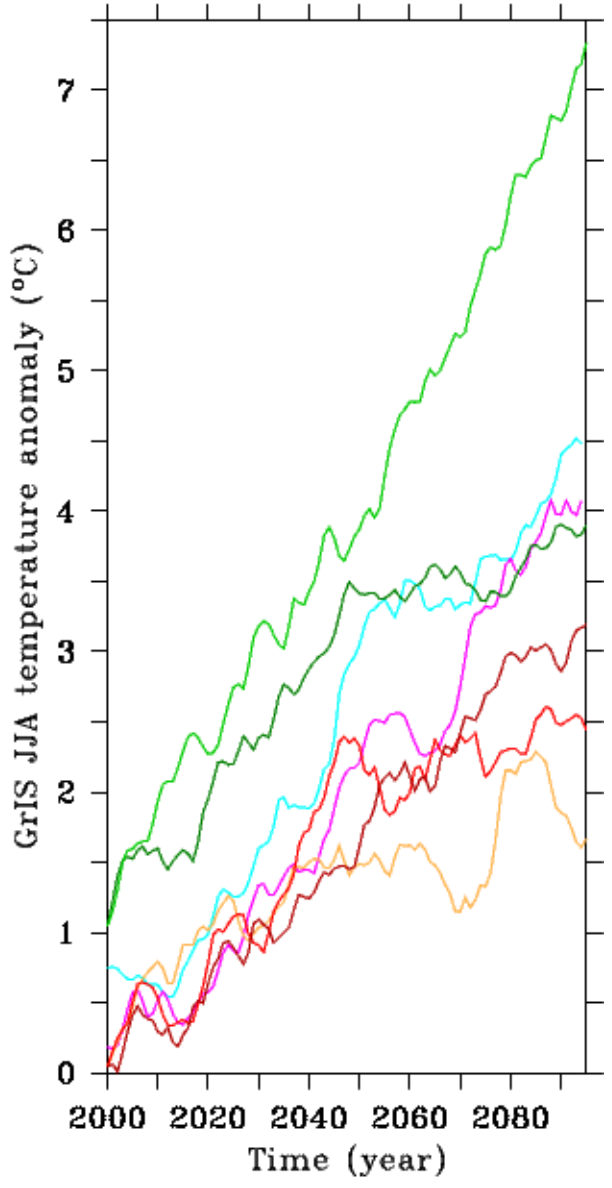
2. MAR based future climate (2/5)



2. MAR based future climate (3/5)

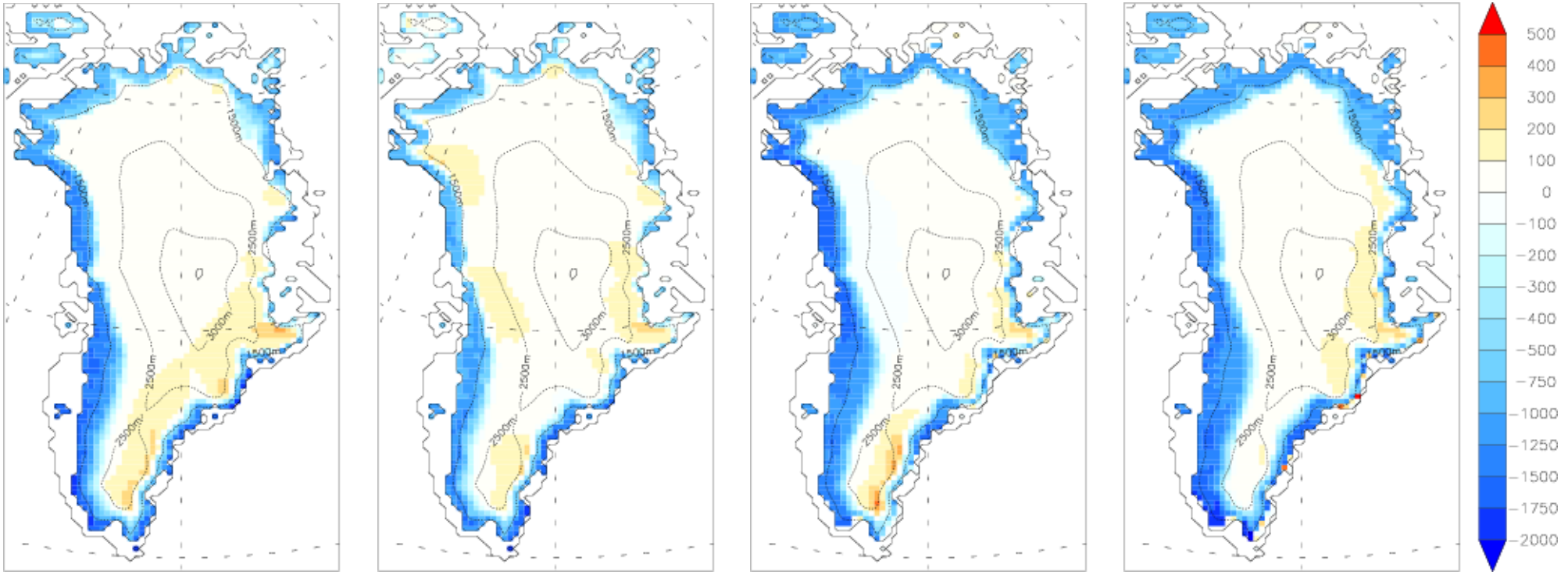






Reference: 1980-1999

2. MAR based future climate (4/5)



MAR forced by CanESM2 (RCP45)

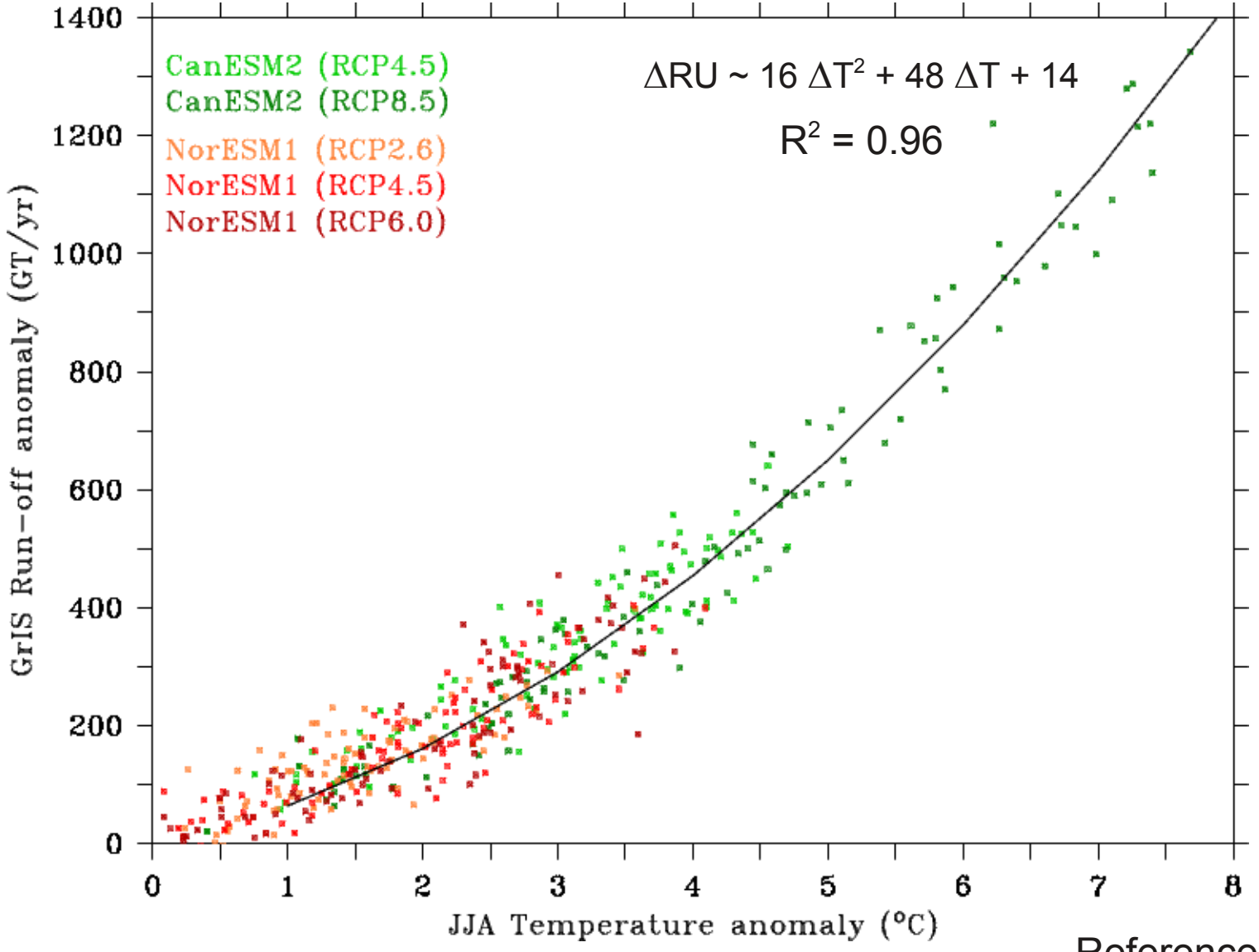
MAR forced by NorESM1 (RCP60)

MAR forced by ECHAM5 (A1B)

MAR forced by HadCM3 (A1B)

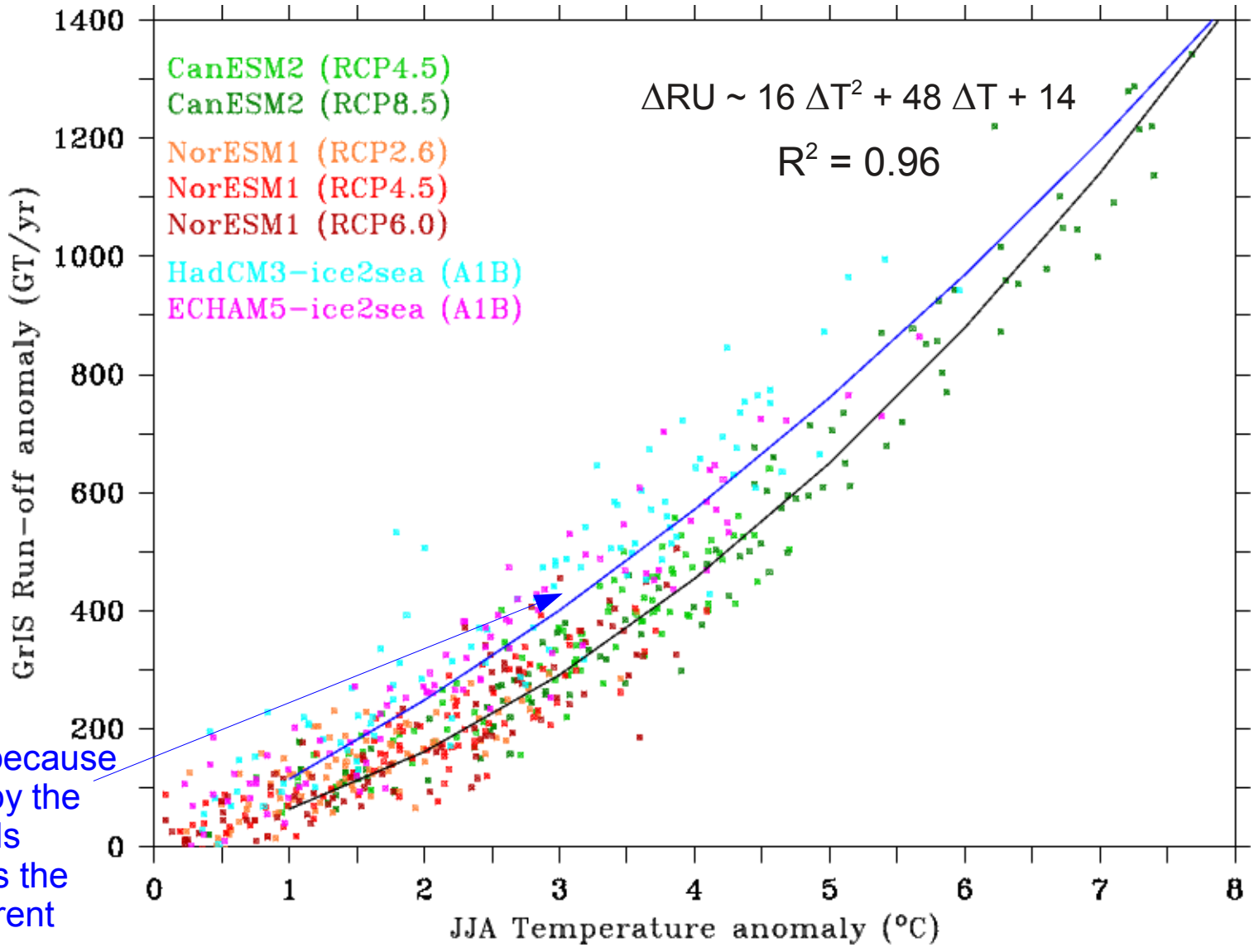
2080-2099 SMB (GT/yr) anomaly in respect to 1980-1999.

2. MAR based future climate (5/5)



Reference: 1980-1999

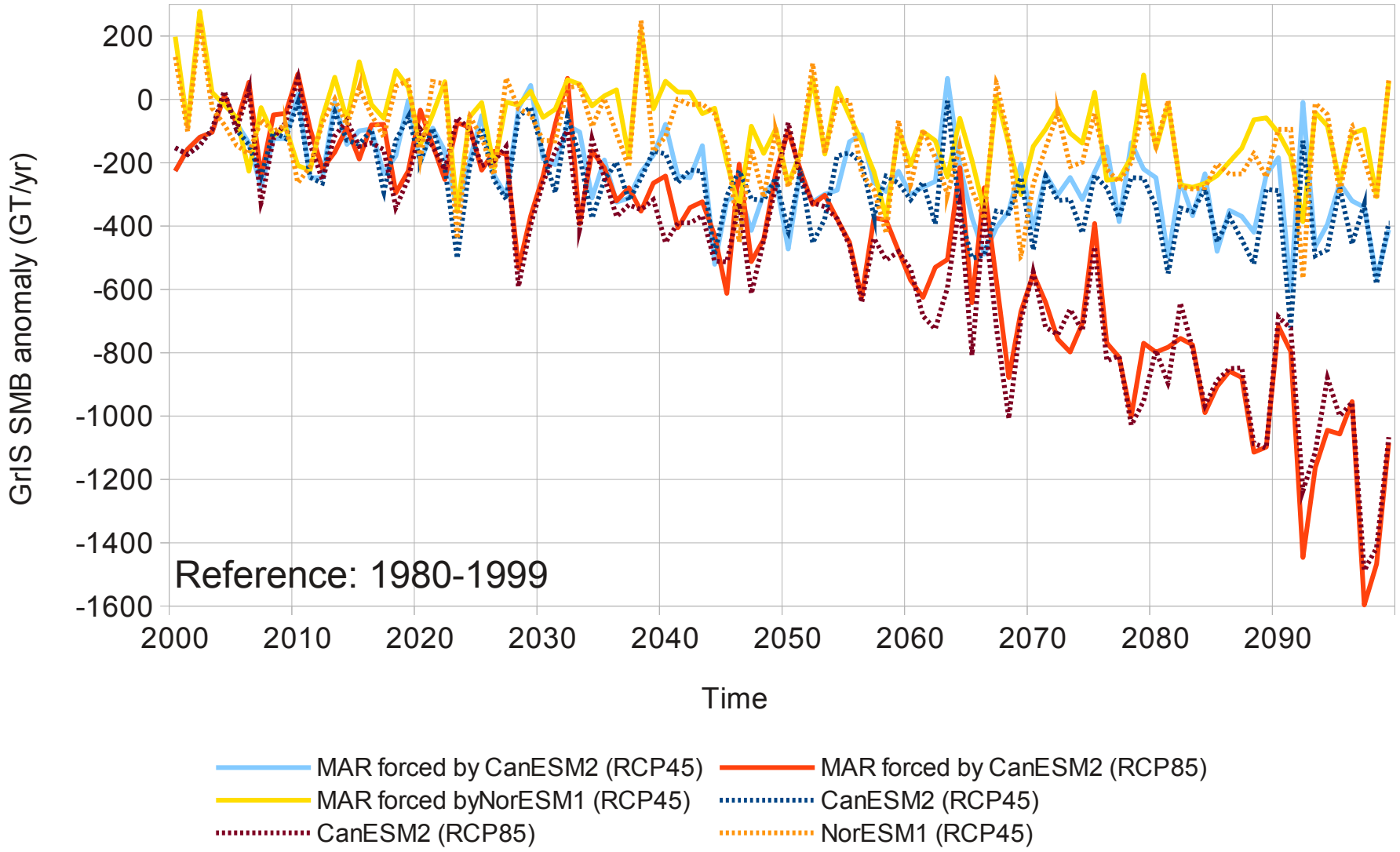
2. MAR based future climate (5/5)



Higher here because MAR forced by the CMIP3 models overestimates the melt over current climate.

Reference: 1980-1999

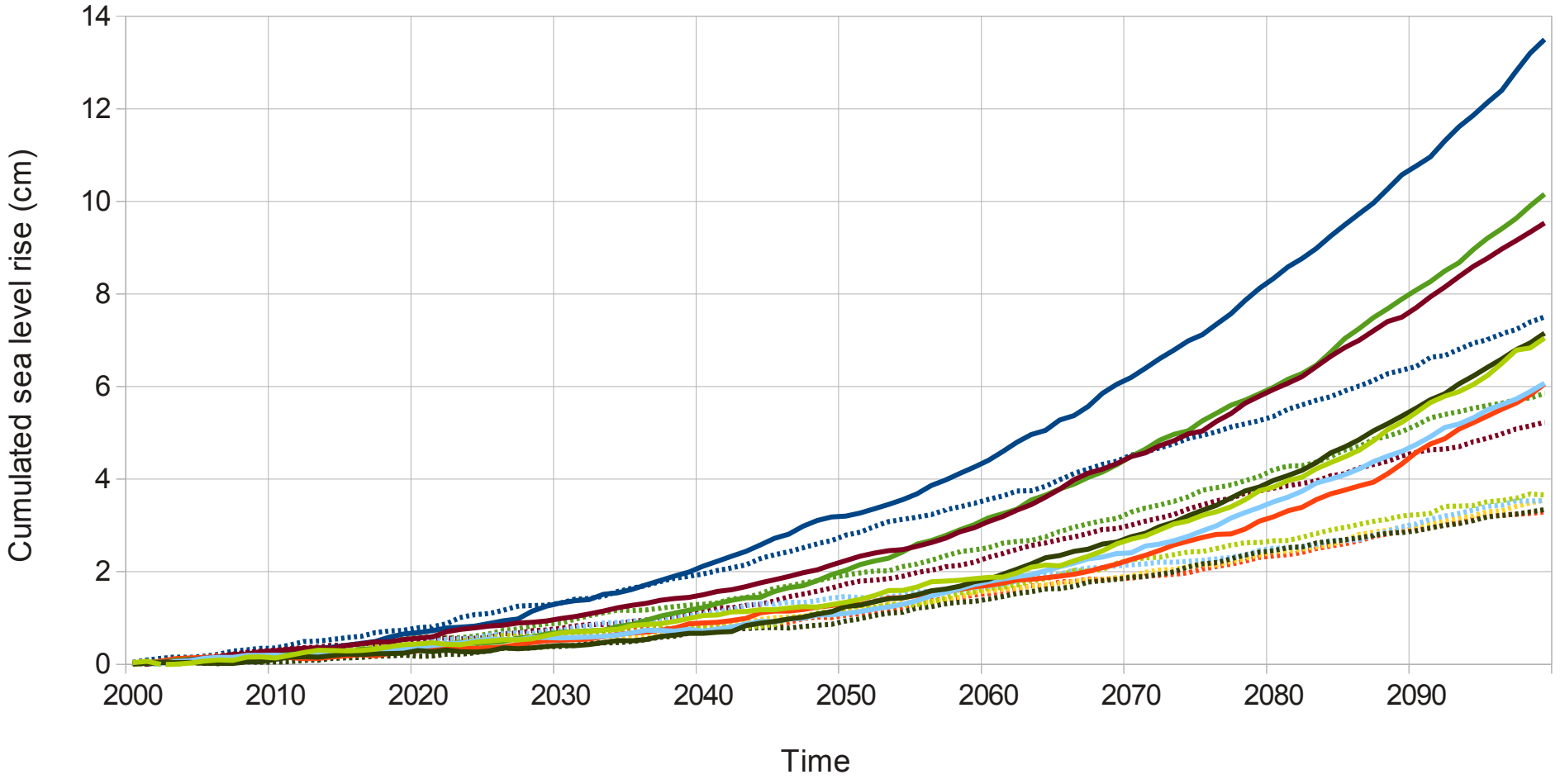
3. GCM's based future climate (1/2)



$$\Delta SMB_{CMIP5} \sim \Delta SF_{CMIP5} - \Delta RU(\Delta T_{CMIP5})$$

where ΔSF and ΔT are taken in the area 60°N-80°N, 60°W-20°W covering the Greenland ice sheet.

3. GCM's based future climate (2/2)



Conclusions:

- Large range in the SLR future projections.
- Importance of successfully simulating the current climate.

Next steps:

- MAR is now running forced by NorESM1 (RCP8.5).
- Testing MIROC5 as MAR forcing.
- Confirming $\Delta RU = f(\Delta T)$ with other RCMs from ice2sea and with the MIROC5 forced MAR simulations.
- Applying ΔSMB to all CMIP5 models for having an ensemble mean.
- Using the MAR future projections the nearest of the ensemble mean as forcing for ice sheet models.

Thanks !